

We claim

1. A multimetal oxide of the formula I,



I

where

a is from 0.3 to 1.9,
10 Q is an element selected from among P, As, Sb and/or Bi,

b is from 0 to 0.3,
15 M is a metal selected from among Nb, Ce, W, Mn, Ta, Pd, Pt, Ru and Rh,

c is from 0.001 to 0.5, with the proviso that (a-c) \geq 0.1,
20 d is a number which is determined by the valence and abundance of the
elements other than oxygen in the formula I and

e is from 0 to 20.

2. A multimetal oxide as claimed in claim 1 in which

25 b is 0 and
c is from 0.01 to 0.1.

30 3. A multimetal oxide as claimed in claim 1 or 2 which has a crystal structure whose X-ray powder diffraction pattern displays reflections at lattice plane spacings d of 15.23 ± 0.6 , 12.16 ± 0.4 , 10.68 ± 0.3 , 3.41 ± 0.04 , 3.09 ± 0.04 , 3.02 ± 0.04 , 2.36 ± 0.04 and $1.80 \pm 0.04 \text{ \AA}$.

35 4. A multimetal oxide as claimed in any of claims 1 to 3 which has a specific surface area determined by the BET method of from 3 to $250 \text{ m}^2/\text{g}$.

5. A multimetal oxide as claimed in any of claims 1 to 4 in which M is Ce or Mn..

40 6. The use of a multimetal oxide as claimed in any of claims 1 to 5 for producing precatalysts and catalysts for the gas-phase partial oxidation of aromatic hydrocarbons.

7. A precatalyst which can be converted into a catalyst for the gas-phase partial oxidation of aromatic hydrocarbons and comprises an inert nonporous support and at least one layer comprising a multimetal oxide as claimed in any of claims 1 to 5 applied thereto.
8. A precatalyst as claimed in claim 6 which contains from 5 to 25% by weight, based on the total weight of the precatalyst, of multimetal oxide.
- 10 9. A precatalyst as claimed in claim 7 or 8 whose inert nonporous support material comprises steatite.
10. A catalyst for the gas-phase partial oxidation of aromatic hydrocarbons which comprises an inert nonporous support and, applied thereto, at least one layer comprising, as catalytically active composition, a silver-vanadium oxide bronze which contains at least one metal M selected from the group consisting of Nb, Ce, W, Mn, Ta, Pd, Pt, Ru and Rh and/or in which the Ag:V atomic ratio is from 0.15 to 0.95 and the M:V atomic ratio is from 0.0005 to 0.25.
- 20 11. A catalyst as claimed in claim 10, wherein the silver-vanadium bronze contains Ce or Mn.
12. A catalyst as claimed in claim 10 or 11 having a layer whose catalytically active composition has a BET surface area of from 2 to 100 m²/g.
- 25 13. A catalyst as claimed in any of claims 10 to 12 which can be produced from a multimetal oxide composition as claimed in claim 1 or a precatalyst as claimed in claim 7.
- 30 14. A process for preparing aldehydes, carboxylic acids and/or carboxylic anhydrides, in which a gaseous stream which comprises an aromatic hydrocarbon and a gas comprising molecular oxygen is brought into contact with a catalyst as claimed in any of claims 10 to 13 at elevated temperature.
- 35 15. A process as claimed in claim 14, wherein the catalyst is produced in situ from a precatalyst as claimed in any of claims 7 to 9.
16. A process as claimed in claim 14 or 15, wherein the reaction mixture obtained or a fraction thereof is brought into contact with at least one further catalyst whose catalytically active composition comprises vanadium pentoxide and anatase.

17. A process as claimed in claim 16, wherein the gaseous stream is passed successively over a bed of an upstream catalyst and a bed of a downstream catalyst, where the bed of upstream catalyst comprises a catalyst as claimed in claim 10 and the bed of downstream catalyst comprises at least one catalyst whose catalytically active composition comprises vanadium pentoxide and anatase.

18. A process as claimed in claim 17, wherein the catalytically active composition of the downstream catalyst comprises from 1 to 40% by weight of vanadium oxide, calculated as V_2O_5 , from 60 to 99% by weight of titanium dioxide, calculated as TiO_2 , up to 1% by weight of a cesium compound, calculated as Cs, up to 1% by weight of a phosphorus compound, calculated as P, and up to 10% by weight of antimony oxide, calculated as Sb_2O_3 .

19. A process as claimed in claim 18, wherein the bed of the downstream catalyst is made of at least two layers of catalysts whose catalytically active composition has a differing Cs content, with the Cs content decreasing in the flow direction of the gaseous stream.

20. A process as claimed in any of claims 14 to 19, wherein o-xylene or naphthalene or a mixture of o-xylene and naphthalene is used as aromatic hydrocarbon and is oxidized to phthalic anhydride.